We Claim:

1. An electronically addressable microchip comprising:

   a. at least one electrode;

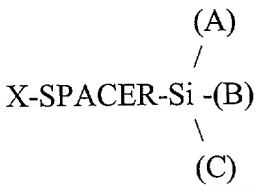
   b. a permeation layer; and

   c. linker moieties connecting said at least one electrode to said permeation layer, wherein said linker moieties are connected to said electrode and permeation layer by covalent bonds, said covalent bonds capable of withstanding a current density of at least 0.04 $nA/\mu m^2$.

2. An electronically addressable microchip according to claim 1 wherein said permeation layer is selected from the group consisting of a polymer, a hydrogel, a porous inorganic oxides created through a sol-gel process, agarose, glyoxylagarose, and polymers synthesized from any of acrylamide, methacrylamide, or a synthetic monomer.

3. An electronically addressable microchip according to claim 1 wherein said electrode is selected from the group consisting of platinum silicide (PtSi), tungsten silicide (WTi), titanium silicide (TiSi), gold silicide (AuSi), platinum/titanium (PtTi), gold /titanium (AuTi), poly(phenylene vinylene), polythiophene, and polyaniline.

4. An electronically addressable microchip according to claim 1 wherein said linker is has the formula



wherein X is selected from the group consisting of acrylate, methacrylate, acrylamide, methacrylamide, allyl, vinyl, acetyl, amine, substituted amine, epoxy and thiol; SPACER is selected from the group consisting of alkyl, aryl, mono- or polyalkoxy, ethyleneglycol, polyethyleneglycol, mono- or polyalkylamine, mono- or polyamide, thioether derivatives, and mono- or polydisulfides; A and B are selected from the group consisting of Oxygen-R, Cl, Br, and an X-SPACER moiety, or any combination thereof, wherein R is H, alkyl,

methyl, ethyl, propyl, isopropyl, and branched or linear alkyl of 4 to 10 carbon atoms, and C is a hydrolyzable moiety selected from the group consisting of Oxygen-R, Cl, and Br, wherein R is H, branched alkyl, methyl, ethyl, propyl, isopropyl, and branched or linear alkyl of 4 to 10 carbon atoms.

5. An electronically addressable microchip according to claim 4 wherein said linker is selected from the group consisting of APS, AEAPS, AHAPS, MOTS, and AMPTS.

6. A method of covalently attaching a permeation layer having reactive moieties to a metal/silicide, metal/metal or an organic electrode of an electronically addressable microchip comprising:

a. contacting said electrode with a linker molecule to form a product of an electrode layered with said linker;

b. contacting said product of (a) with a permeation layer matrix; and

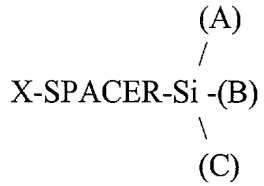
c. subjecting said product of (a) and matrix to a chemical reaction wherein a result of steps (a), (b) and (c) is covalent bonding between a first reactive moiety of said linker and said electrode and a second reactive moiety of said linker and said permeation layer matrix, said covalent bonding capable of withstanding a current density of at least 0.04 $nA/\mu m^2$.

7. A method according to claim 6 wherein said metal/silicide electrode is selected from the group consisting of platinum silicide (PtSi), tungsten silicide (WTi), titanium silicide (TiSi), and gold silicide (AuSi).

8. A method according to claim 6 wherein said metal/metal electrode is selected from the group consisting of platinum/titanium (PtTi) and gold /titanium (AuTi).

9. A method according to claim 6 wherein said organic electrode is selected from the group consisting of poly(phenylene vinylene), polythiophene, and polyaniline.

10. A method according to claim 6 wherein said linker has the formula



wherein X is selected from the group consisting of acrylate, methacrylate, acrylamide, methacrylamide, allyl, vinyl, acetyl, amine, substituted amine, epoxy and thiol; SPACER is selected from the group consisting of alkyl, aryl, mono- or polyalkoxy, ethyleneglycol, polyethyleneglycol, mono- or polyalkylamine, mono- or polyamide, thioether derivatives, and mono- or polydisulfides; A and B are selected from the group consisting of Oxygen-R, Cl, Br, and an X-SPACER moiety, or any combination thereof, wherein R is H, alkyl, methyl, ethyl, propyl, isopropyl, and branched or linear alkyl of 4 to 10 carbon atoms, and C is a hydrolyzable moiety selected from the group consisting of Oxygen-R, Cl, and Br, wherein R is H, branched alkyl, methyl, ethyl, propyl, isopropyl, and branched or linear alkyl of 4 to 10 carbon atoms.

11. A method according to claim 10 wherein said linker is selected from the group consisting of APS, AEAPS, AHAPS, MOTS, and AMPTS.

12. A method according to claim 6 wherein said permeation layer is selected from the group consisting of a polymer, a hydrogel, a porous inorganic oxides created through a sol-gel process, agarose, glyoxylagarose, and polymers synthesized from acrylamide, methacrylamide, polyacrylamide, or a synthetic monomer.

13. A method according to claim 6 wherein said bonding between said linker and permeation layer results from a Schiff base reaction.

14. A method according to claim 6 wherein said second reactive moiety of said linker comprises an amine group.